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AUTHOR Martys, Michael; Redman, Don; Huff, Alice; Czar, Dave; Mullane, Pat; Bennett, Joseph; Getty, Robert

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ABSTRACT

In 1997, Gettysburg College (Pennsylvania) deployed the CNAV (College Navigation) Web tool to allow the students' and the entire college community the ability to better navigate through its college's curricular, co-curricular, and extracurricular offerings. CNAV is unique because, rather than treating the Web as a series of static pages, it treats the Web as a series of "puzzle pieces" that can be assembled into different views. CNAV remembers the particular interests (attributes) of every campus member and uses this information to draw the campus member's attention to pieces the individual would find interesting. Approximately 76% of faculty, staff, and students have used CNAV, and approximately 50% of the students and faculty use it frequently. CNAV currently runs on a Sun Sparcserver 3000, using an Oracle database and Netscape Commerce Server. A customized Excite search engine provides keyword searching on courses, people, and groups. The functionality of CNAV includes: course information, course information-editing tools, electronic reserves, communication, online course deficiency tool, privacy, interest tool, interest matching tool, personal information, online transcripts, surveys, campus events, campus-wide bookmarks, financial reports, e-mail aliases on the fly, fast e-mail access to student advisors, keyword and multiple condition search tools, group tools, customizability, appointment tracking tools, access logs, and high level overviews. Admissions, alumni, and advising modules are under development. (AEF)

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CNAV
A Unique Approach to a Web-Based College Information Navigator at Gettysburg College

Michael Martys, Vice Provost for Information Resources and Director of Computing
Don Redman, CNAV Programmer/Analyst
Alice Huff, CNAV/MIS Programmer/Analyst
Dave Czar, CNAV/MIS Programmer/Analyst and DBA
Pat Muliane, Director of Career Planning
Joseph Bennett, President, Perfect Order Inc.
Robert Getty, Consultant, Perfect Order Inc.
Gettysburg College
Gettysburg, PA 17325

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Project Summary

In the fall of 1997, the Information Resources department at Gettysburg College deployed the CNAV (College Navigation) web tool. We created this web tool to allow our students, and the entire college community, the ability to better navigate through the college's curricular, co-curricular, and extra-curricular offerings, allowing the students to enhance their college experience as a result. The tool was designed to help the college community discover what Gettysburg had to offer and more importantly, discover new connections between those offerings.

Our original effort to solve this problem (which started somewhere around the summer of 1995) took the form of a typical group of web pages - many pages describing courses, events, extra-curricular activities, professors, etc. As this project grew in size, we began to contemplate the particular page structure needed to facilitate the discovery process. We decided to talk to students about the structure; our thinking was that if we could understand our students' thinking as they wandered through a web hierarchy, then we would be able to derive a structure that worked well for them.

The results of our discussions caused us to re-evaluate our approach to this problem. We discovered that the students' thinking was quite varied and dealt with questions we did not expect. Statements such as "I am bored" or "I am unhappy with what I am currently doing" were common. Students complained about discovering campus offerings too late to take advantage of them. When they found something that interested them (such as a lecture) they had difficulty finding other things (such as courses) that were similar to that lecture.

As a result of those discussions, we radically altered our approach to this problem. In our minds, the solution was to create a system that was interactive and focused as much on the student as it did on the college's curricular, co-curricular, and extra-curricular offerings. Rather than trying to make a static web hierarchy, we decided to make a "smart" web tool that would make it easier for students and others to find connections between themselves and other people, courses, or events on campus. Our smart web tool took the form of a Netscape secure web server, an Oracle database, Excite search engine, data exchanges between our system and other computers on campus, and approximately 700 cgi's and 490 database tables.

CNAV is unique because, rather than treating the web as a series of static pages, it treats the web as a series of "puzzle pieces" that can be assembled into different views. Courses, extra curricular offerings, events, information about groups of people, and individuals themselves are treated as puzzle pieces inside of CNAV. The unique attributes of each of these items can be thought of as the "edges" of the puzzle pieces. CNAV allows each user to describe those "edges" with as much detail as possible. For example, a student who is sponsoring an event can associate a web page with the event, a text description, indicate who might be interested in the event, list the event sponsor, who to contact for additional information, as well as the more mechanical details of where and when the event is to take place. A faculty member who teaches a course can associate a course homepage, syllabi, readings list, faculty web page with the course; add their own course description to the official description; indicate who might be interested in the course; and describe what skills, competencies and what academic themes the course covers. CNAV will use all of this information for the "description" of the course and CNAV allows totally unique information for each course section, each semester, and each year that it is taught.

From the CNAV user's perspective, how they view the "pieces" can vary depending upon what the user is interested in finding. In addition, once a CNAV user finds a puzzle piece (say, an event) that is interesting, he or she can then use the piece to find other pieces like it (such as a course). Because of this capability, truly unique ways of searching are possible. For example, in CNAV, it is possible for a "course" to search for "students", "a campus event" or find similar "courses".

CNAV remembers the particular interests (attributes) of every campus member and uses this information to draw the campus member's attention to "pieces" that the individual would find interesting. CNAV also communicates with other computers on campus (most importantly, our legacy MIS system) to acquire as much knowledge about the individual as possible. Because of this feature, it also acts as a robust student information system, providing web access to financial, academic, and other college information for each individual on campus.

CNAV takes on different personalities for different groups of individuals on campus. Each personality is optimized for that group - for example, faculty members get tools that allow them to edit course information, access their advisees' information, access budget information, etc. Advisors get tools that allow them to track appointments, access student records, monitor mid-term deficiencies. Students get tools that provide access to campus events, course catalog, electronic reserves for their courses, personal budget information, and the courses they are taking this semester.

CNAV is the first software program deployed at Gettysburg intended to be used by the entire campus. Approximately 76% of the entire campus (faculty, staff and students) have used CNAV, and approximately, 50% of the students and faculty use it frequently. Considering that CNAV was first available to the entire campus the fall of 1997, we are very encouraged with these results.

One of CNAV's unexpected benefits is that our campus community is now making the cultural change necessary to deal with on line information tools. Faculty members who would never deal with a web application are now happily using CNAV.

Another benefit is that since CNAV provides a secure, confidential web engine, and since it already contains our legacy data, it allows all sorts of follow-on projects. Some of these new initiatives are

support for prospective students (which is nearing completion), a student portfolio tool (which is nearing completion), alumni-student mentoring (due August 1998), and on line course evaluations. CNAV has also forced us to face the realities of electronic privacy and intellectual property issues.

CNAV was programmed in house and required approximately 4.5 FTE years of programming talent. Many offices from the campus were involved and continue to be involved in different aspects of its design, including admissions, academic advising, public relations, career advising, and the faculty as a whole.

Application Description

CNAV currently runs on a Sun Sparcserver 3000 with two processors and 512 MB of memory. It uses an Oracle database, running version 7.3.3, and uses a Netscape Commerce Server. We currently run all connections to CNAV encrypted using a 40-bit key; thus allowing us to use encrypted connections overseas. CNAV is comprised of approximately 700 PERL scripts and 490 database tables.
A customized Excite search engine provides keyword searching on courses, people, and groups. The customizations allow the user to refer back to the course, people or help database instead of accessing random web pages, and if the user is searching for people, the customizations allow him or her to build an email alias "on the fly" using the results of the search.

CNAV makes heavy use of web pages to describe things. Courses, people, events, and groups can all be described by associating a web page with that item. Rather than have users create web pages on CNAV itself, CNAV allows users to put the web pages anywhere, and simply indicate to CNAV where they are. This approach lets people use their favorite web-page creation tools as well as to store their web pages in whatever web directory space is most convenient. CNAV assembles these pages so that a user does not notice that the pages are on other servers. CNAV uses web crawlers to load these pages into its Excite search engines.

CNAV communicates with three other computer systems at Gettysburg on a nightly basis. These are our legacy MIS (to obtain all people, course, prospective student, and alumni information), our student ID computer system (for photos of everyone on campus), and our campus events computer (to obtain information on upcoming and past campus events). Using MIS data, CNAV automatically creates accounts for new campus community members. Passwords for these new accounts are distributed to the appropriate people on campus via another CNAV tool.

CNAV has a context sensitive on line help system. With the entire campus being able to use CNAV, deploying a program of this size is logistically difficult. Thus the help system has to be capable of playing a major role in teaching people how to use CNAV. Because we wanted this help system to have a student's perspective, primarily student workers wrote it. Help screen content changes based on where you are in the system and who you are (faculty, staff or student), thus improving the effectiveness of the help screens.

A typical user interacts with CNAV by first using a secure (https) web address to access CNAV. After a user logs on, all communications with CNAV are performed in a secure (encrypted) manner, thus allowing CNAV to share confidential information with the user anywhere in the world.

Depending upon who the user is, CNAV will bring up the appropriate tools for that user. These tools are broken down into three basic groups - faculty, student and staff. The section below outlines some of the capabilities of these tools.

What an Individual Can Do in CNAV

We have found over the last couple of years that CNAV is a hard tool to describe because it handles so many different tasks. The best way to describe CNAV is through a demonstration of its abilities. The second best method is to list some of CNAV's functionality, which-given the large number of things it can do-is somewhat difficult. This is a partial list:

Course information: CNAV maintains a section and catalog level course catalog on line. All administrative data is available for all courses (enrollment, class roster, description, previous years and semesters the course was offered, etc). The catalog is historical, with the last 10 years of course section history on line. For example, it is possible in CNAV to bring up the Math 101 Spring 1996 section A, Math 101 Fall 1994 section D, as well as the current (Spring 1998) course catalog entry for Math 101. The historical section information is very useful for a small liberal arts college such as Gettysburg since many courses are taught on 2 or 3 year cycles, many sections of a course are taught differently, and finding a description of the last course taught might mean looking back 3 years. It also is very useful for seminar and colloquy type courses that are only taught only once or twice.

Course information-editing tools: CNAV provides faculty special tools so they can edit the information for the courses that they teach. The editing tools allow them to attach course home pages, web page syllabi, web page reading lists, and faculty home pages. Faculty can also link interests to the course (including course themes, skills, and competencies), as well as create their own enhanced version of the course description. The linked web pages can be anywhere in the world. CNAV uses a web crawler to "pull" these pages into the CNAV course search engines.

Electronic Reserves: Electronic reserves are provided as part of the course catalog information, as well as part of a student or faculty member's "this semester" view. CNAV monitors and enforces course membership restrictions in order to remain compliant with copyright restrictions. CNAV also tracks access to these reserve materials on an individual access basis to enable proper payment of copyright fees.

Communication: Students and faculty can see who is in their classes, including rosters for the future semesters if they have pre-registered. They can easily access all the biographic information of fellow students, as well as their photos, interest summary, major summary, etc. Faculty has quick email access to the faculty advisor(s) of each student in their class.

On line Course Deficiency Tool: CNAV provides faculty with the ability to submit on line deficiencies, as well as "excellent" performance reports. Each deficiency is routed via email to the student's academic and faculty advisors, as well as the student. The student CNAV screen has special "alerts" that appear when a student has a deficiency outstanding, and the faculty advisor CNAV screen will see the same special "alert" on their "list my advisees" CNAV screen.

Privacy: There is a detailed privacy subsystem that allows each user to carefully control who on campus can see each item of their "public" information such as their photo, campus address, campus phone, home address, home phone, class schedule, etc. There is a separate level of access control for students, campus employees and the outside world. Each data item (photo, home address, phone number, campus address, etc) is individually controlled. For example, it is possible for a student to allow CNAV to display their photo, campus phone number, and campus address to fellow students, but to only display their campus phone number to people outside of the college.

Interest Tool: CNAV allows the faculty and advisors to create a list of interests (perhaps they would be better called attributes) that can be used to describe campus events, courses, individuals, and groups of people. The reason for using the term "interests" was that when CNAV was first being created we were interested in describing "what was interesting" about each item or puzzle piece in CNAV. These interests are be grouped into categories, which then can have subcategories, which then have a list of "interests".

For example, presently in CNAV, the Gettysburg faculty and staff have created the categories: "Course Themes", "Options for Involvement", "Personal Interests", "Things you like to do", "Skills & Competencies", "Things I Care About", "Things to Do, Places to See", "Tools for Survival and Success". The category "Course Themes", has the subcategories: "Ethnic/Cultural Studies", "Historical Studies", "Modern Society" and " Science & Technology". "Historical Studies" has the interests: "Victorian Studies", "Renaissance", "American Studies" and several others.

The reason for having a tool that can create such a complex and rich interest "language" is that when we first started working on the CNAV project we discovered that different groups of the campus used different terms to describe things. Faculty would use one set of terminology to describe courses, and students would use another set of terminology to describe what they were interested in studying. In order to do the matching that we had hoped to do, we needed to provide some sort of common language.

Interest Matching Tool: CNAV has special tools that allows CNAV to find connections between things based on how similar those items are, or based on what particular interest (or attributes) of an item you are interested in. This is a very unique and powerful tool in CNAV, because this tool that allows you to take one puzzle piece and find another like it. For example, it is possible to attend a campus event, then to use CNAV to find courses that are similar to that event, or to find professors that have interests similar to that campus event. It is possible to have courses find students, students to find other students they have a lot in common with, for clubs to find students who share similar interests and so on.

Personal Information: All community members can update their personal information (addresses, name, billing address, etc) via CNAV. They can also inform CNAV where their homepage is, where their resume (or vita in the case of faculty and staff) web page is, as well as their web portfolio. CNAV uses a web crawler to "pull" those pages into the CNAV search engines. User's can also inform CNAV of their personal interests. CNAV uses these interests to point out campus events and URL's that might be of interest to the user. Users have the ability to "hide" their interests from other users of CNAV. Thus, a student who indicates that they have an interest in Math can hide that fact from the rest of the campus.

On line Transcripts: Students have access to their transcripts on line. Each transcript is hyperlinked so that each course refers back to the historical course section level catalog entry. It is possible for students to see who was in each of their classes, including photos. Historical web data is maintained for each course, as well as instructor data. The transcript can be displayed in department, division, or semester order to help with advising issues. At Gettysburg, all faculty members are considered advisors, and those faculty and other campus advisors who are not the primary advisor of a student can have access to a student's transcript if justification is given. CNAV enforces transcript access restrictions and provides logging tools that allow the registrar to monitor to the student's records.

Surveys: CNAV has a built-in survey tool that allows on line surveys to be created and administered to various campus constituencies. Confidentiality and authentication are provided along with a fine control of who takes the survey. For example, it is possible to survey "all female biology majors", "all residents of a particular building", or "all members of a particular course (including optional, last semester, next semester, and this semester subgroups)." Results can be obtained instantaneously. Anonymous-response surveys are allowed. CNAV has the ability to create an instant email alias out of the group of people who gave a particular answer to a question on the survey.

Besides being used for general-purpose surveys, this tool was created with the idea that there were times when students could not discover things on their own without a little help. The survey tool would allow someone to ask questions of groups of students, and then based on their answers, target specific responses to each group. For example, it would be possible in CNAV for the internship office to survey all of the sophomores about their summer plans. For those students that answered that they did not have any plans, CNAV would allow the internship office to send email to those students alerting them to the various internship and summer job opportunities on available on campus. For those students that indicated that they did have plans, CNAV would allow the internship office to ask how many of those students are planning internships.

Campus Events: CNAV has a series of campus event tools that allows each member of the campus to submit campus events. Each event can be described in detail, and a link can be made to the event's web page. CNAV maintains an RSVP list for each event, and allows the event owner to have access to an instant email alias of all users who have RSVP'd. Each event can be tagged with interests; CNAV then uses these interests to draw the attention of other CNAV users who have expressed similar interests to this event. There are special tools that allow for the editing of a previously submitted event by the event owner, requests for room reservations, and search tools that allow for searching for events during certain periods of time or based on interests. CNAV communicates with the main campus room reservation computer system so that it knows of all currently scheduled future events.

This campus event system will soon be made public on the Gettysburg Web Page (due late April 1998). Campus privacy issues needed to be first addressed; as a result, a modification needed to be created that would allow specially tagged events to be blocked from off-campus view.

Campus-wide Bookmarks: CNAV has a series of campus-wide bookmark tools that allows each member of the campus to submit URL's to the global URL database. This database can be thought of as a set of "bookmarks" that the entire campus shares. What makes these bookmarks unique is that each URL can be tagged with interests, which CNAV then uses to draw the attention of other CNAV

users who have expressed similar interests. CNAV keeps track of who submitted each URL, as well as the date, so that a user's name can be used as selection criteria as well.

Financial Reports: CNAV gives users access to their financial reports. Students can see their bookstore bill, current college tuition statement, phone bill, and traffic ticket bill on line. Faculty and staff can access any departmental budget reports that they normally would receive in paper form. Reports are updated daily.

Email aliases on the Fly: CNAV allows users to create instant email aliases as a result of almost any search or query. For example, it is possible in CNAV to send email to all faculty who like banjos, all members of a floor in a campus building, all biology minors, all members of Sociology 101 section "A", all members of the 1997 football team, all people who like classical music, etc.

Fast Email Access to Student Advisors: CNAV provides all faculty and staff with fast email access to all advisors of any student. This allows an instructor to quickly contact the advisor of any student who is having problems in his or her class. All faculty have direct access to their advisees, including photos, student records, deficiency alerts, and a student planner.

Keyword and multiple condition search tools: CNAV has two types of search tools - keyword, which is based on the Excite search engine, and multiple condition, which is a database search. Keyword search tools exist for searching through faculty, the campus community, and all 10 years of course data. Each tool allows the creation of an instant email alias based on the search results. The search engines make use all information about each item (including web pages) when performing a search. Multiple condition searches allow very specific searches that are based on certain criteria. For example, in CNAV it is possible to find all students living on a particular floor in a particular building; to find all courses taught in the last 10 years by a particular professor; to find all English courses with available seats on Tuesdays at 10 am, and so on.

Group tools: CNAV has a series of tools that allows groups on campus to identify themselves. Each group can create its own email alias, assign members, describe itself, point to its own web page, and assign interests to itself. Each group can subsequently be edited and maintained by the group's creators. CNAV uses the group's interests to find courses, events, individuals and other groups that have similar interests. Each group can allow people to join automatically or join after approval of the group creator. CNAV users can search the list of groups to find groups that would interest them. This tool was created from the idea that there were many groups of students on campus doing interesting things, but hardly anyone knew about them. Many of these groups are unofficial, meaning they do not have formal recognition by the college. The idea was that given a chance to identify themselves, they would do so. In practice, this is turning out to be true.

Customizable: CNAV uniquely draws every CNAV web screen based on that particular user's preferences. This includes the ability to choose between three different menu systems, the ability to customize what screen appears first for them, and the ability to ask CNAV to filter things based on how well those things match the users chosen interests. For example, in CNAV it is possible to have CNAV only display campus events that have a very high degree of correlation with your personal interests and hide those from view that do not.

Appointment Tracking Tools: This series of tools is used by administrative advising offices, such as career planning, to help track student interactions with the office and share that information with the student. The office creates an appointment record upon completion of the meeting and enters any pertinent notes and comments as well as assigning category and outcome codes to the appointment. The student can pull up their own records and review their appointments and notes.

Access logs: CNAV has special tools to monitor and log accesses to student transcripts by various Gettysburg student advisors. The registrar uses this tool to monitor accesses to transcript to ensure campus policy is followed with regards to transcripts. CNAV also monitors the use of electronic reserves, tracking each individual access for each document in each course. This ensures copyright compliance and allows us to pay the appropriate copyright usage fees.

30,000-foot views: CNAV has several special tools that allow high level overview of various data elements in CNAV. For example, CNAV can display a high level overview of the current CNAV course catalog. It can indicate which courses in CNAV (and which sections) have home pages, faculty web pages, syllabi, reading lists, interests, and enhanced descriptions. This information is available for all departments, and for each semester and year. Thus it is possible at a quick glance to see how much material is available for each department, and how it changes over time. This is very useful for targeting training and assistance initiatives.

Looking to the Future

CNAV has been well received by our campus community. As a result, they want new features and capabilities. Three new modules are currently under development. Each module is being developed in coordination with the appropriate departments. A brief description follows:

Admissions: A new CNAV module is being built (currently in beta; formal release March 23, 1998) that will allow all accepted students to have: on line access to their admissions materials; to submit any college forms electronically (and be able to edit them in subsequent visits); to easily contact everyone on campus with whom they have had previous contact (including photos). For each one of their interests (for example, lacrosse and biology), the designated campus contact (again with photo) will be provided.

Alumni: A new CNAV module is being built (beta release due August 1998) that will allow all alumni to have the same CNAV capabilities as all campus members. Special alumni tools will allow them to contact other alumni (by various criteria, such as geographical region, sport, year of graduation, campus activities, etc). The primary purpose of this module is to foster student-alumni interaction and mentoring. As such, special tools will be provided which will allow alumni to search for and contact students who share academic, career, or personal interests, and likewise for students to search for alumni. Alumni will have access to their personal information (addresses, memberships, event registration, giving record), and recent alumni will also have scholastic information such as an online transcript. Alumni photos will be scanned from previous yearbooks and alumni will be able to update their photo's online. An extension of CNAV's privacy tools will allow Alumni to control who (students, faculty, employees, or other alumni) has access to their information.

Advising: A new CNAV module is being built (currently in beta, formal release August 1998) that will allow students to manage a portfolio. The portfolio will allow students to plan and list academic, co-curricular, and extra-curricular activities, allow and facilitate reflection on these activities, and provide display tools to allow different views of the portfolio. The goal of this module is a more holistic approach to the college experience; with the help of CNAV, students will be able to see the connections between all aspects of their years at Gettysburg.

Major Contributors:

Michael Martys, Vice Provost for Information Resources and Director of Computing
Mike is the project leader for CNAV, guides the future direction, provides technical advice and direction, and acts as the primary liaison to other campus groups who contribute ideas and concepts to CNAV.

Don Redman, CNAV Programmer/Analyst
Don is the primary "front end" web programmer for writing the majority of the code that is used to create the custom web screens. Don also works with departments, conceptualizes new functions, and provided the primary "bug" support for the end users of CNAV.

Alice Huff, CNAV/MIS Programmer/Analyst
Alice acts as the primary end-user support person CNAV, monitors CNAV security, performs specialized CNAV training and troubleshooting, and acts as the CNAV evangelist.

Dave Czar, CNAV/MIS Programmer/Analyst and DBA
Dave is the college expert for our Oracle databases, the college expert on the legacy systems and data content, and is responsible for the communications of CNAV with other information systems on campus.

Pat Mullane, Director of Career Planning
Pat's acted as a campus representative to the CNAV programming team, bringing specialized expertise in the areas of advising, user interface, and end-user. Pat also acted as an evangelist and a liaison with many of the campus departments.

Joseph Bennett, President, Perfect Order Inc.
Joe is a consultant from a consulting firm called Perfect Order Inc. Joe primarily acted as the CNAV's database expert. Joe also provided technical advice direction for the CNAV team, conceptualized many CNAV functions, and did some of the front-end programming. Joe left the project at the end of 1997.

Robert Getty, Consultant, Perfect Order Inc.
Bob took over from Joe as a consultant with Perfect Order Inc. Bob presently is doing database work and front-end programming.